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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,638	10/19/2001	David Patrick Magee	TI-32986	8619

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
JAMAL, ALEXANDER	

ART UNIT	PAPER NUMBER
2643	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/044,638	MAGEE ET AL.	
	Examiner	Art Unit	
	Alexander Jamal	2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-53* is/are pending in the application.

4a) Of the above claim(s) *1-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *33-53* is/are rejected.

7)☒ Claim(s) *37* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Based upon the submitted amendment (8-9-2005), the examiner notes that claims 1-32 have been cancelled and claims 33-53 have been added.

Claim Objections

2. **Claim 37** objected to because of the following informalities:

"Ration" should be changed to "ratio".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 33-53** rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir et al. (6795409) and further in view of Raleigh (6006110) and further in view of Paulraj et al. (6377636).

As per **claims 33,38,43,** Youssefmir discloses a communication system and associated method with data and training signals configured as shown in Fig. 5C, 5D (Col 25 lines 50-67, Col 26 lines 50-60). The system may use pilot tones sent with each data packet in order to determine weighting factors (for noise mitigation) for the base station (Col 27 lines 43-55). When training tones are used, the system inherently comprises a training tone extractor to extract training tones (first type of tones) from the received (by a receiver) data signal (second type of tones). However, Youssefmir does not disclose the specifics of the antenna training including a noise estimator computing a noise estimation based on the training signals. Youssefmir further does not disclose that the training tones are indexed such that each training tone noise/channel estimate is used for it's nearest data tone noise/channel estimate.

Raleigh discloses a communications system using a blind adaptive technique to reduce interference and multipath fading (noise). Raleigh discloses that the technique may be used with training tones (a first type of tones) (Col 7 lines 40-47) to improve communication quality, and account for multipath fading (Col 3 lines 40-60). The system further comprises a noise estimator (Col 8 lines 35-45) to estimate the noise (SNR) of the received signals (Col 8 lines 10-25). The estimates are used by a beamformer (where the data comprises a second type of tones) (Col 5 line 50 to Col 6 line 8). It would have been obvious to one of ordinary skill in the art at the time of this application to implement Raleigh's noise reducing method for the purpose of improving communication quality, and accounting for multipath fading.

Paulraj discloses a beamforming system that uses training tones to estimate the noise of each channel (channel estimates) in order to use that noise estimate for the corresponding data tone in that channel (Col 10 lines 4-14). The system may transmit the both the data and training tones together (Col 13 lines 33-61). In this embodiment the system inherently comprises an indexing function that uses the noise estimate of the nearest training tone to each data tone for the purpose that the correct channel estimate (with each channel comprising a training tone and it's nearest data tones) be used for each data tone. It would have been obvious to one of ordinary skill in the art at the time of this application to utilize the training tone nearest each data tone for the noise estimate for the purpose of improving communication quality by the fact that the nearest training tone will supply the most accurate channel estimate for each data tone.

As per **claim 51,** claim rejected for same reasons as claim 33 rejection. Additionally, Youssefmir discloses antennas (Fig. 1). The system further comprises antenna 56 (RALEIGH: Fig. 3) and the means to convert the received antenna signal into a digital signal in the frequency domain (RALEIGH: Col 6 lines 30-45, Col 11 lines 15-30, note the phase term in line 22). Additionally, Youssefmir's system may be an FDMA or FDD system (YOUSSEFMIR: Col 28 lines 35-40), and Fig. 5D discloses that the training tone signals are fewer in number than the data signals.

As per **claims 34,39,** the noise estimator computes the difference (error signal) between a received training signal and a previous training signal (RALEIGH: Col 15 lines 25-40). The system calculates the variance and covariance (first and second indications) (RALEIGH: Col 11 lines 40-56). The system time averages the covariance (RALEIGH: Col 15 lines 1-10).

As per **claims 35,40,45,** claim rejected for same reasons as claim 51 rejection.

As per **claims 36,41,46,** claim rejected for same reasons as claim 51 rejection. The system uses the noise indication, and channel estimates (via inputs) in a beamforming system (RALEIGH: Col 6 lines 45-65).

As per **claims 37,42,47,** the system calculates soft decisions and noise to signal (SINR) for each of the tones (RALEIGH: Col 14 lines 10-21).

As per **claim 44,** claim rejected for same reasons as claim 34 and 36 rejections.

As per **claims 48,49,** Raleigh discloses that the transmit and receive channels may be implemented as an application specific integrated circuit (special purpose dsp) (Col 6 lines 1-10). A DSP inherently comprises executable instructions (software) for the purpose of controlling the DSP.

As per **claim 50,** claim rejected for same reasons as claim 51 rejection.

As per **claim 52,** claim rejected for same reasons as claim 51 rejection.

As per **claim 53,** claim rejected for same reasons as claim 36 rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 571-272-7498. The examiner can normally be reached on M-F 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 571-272-7499. The fax phone numbers for the organization where this application or proceeding is assigned are **571-273-8300** for regular communications and **571-273-8300** for After Final communications.

AJ
October 5, 2005

CURTIS KUNTZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600